

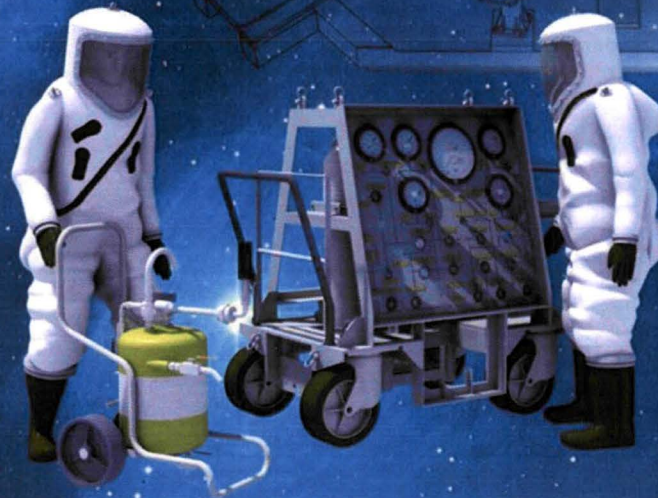
Simulation – Moving Beyond the Static

Virtual models are articulated with behaviorally accurate movement matched to the real world using inverse kinematics, engineering specs, and known range of motion for each articulating joint. Optimal equipment placement is determined and clearances verified. Operational tasks are simulated. Reach and access assessments are made using manikins, checking ergonomic assessment and operational safety.

Kennedy Space Center Design Visualization

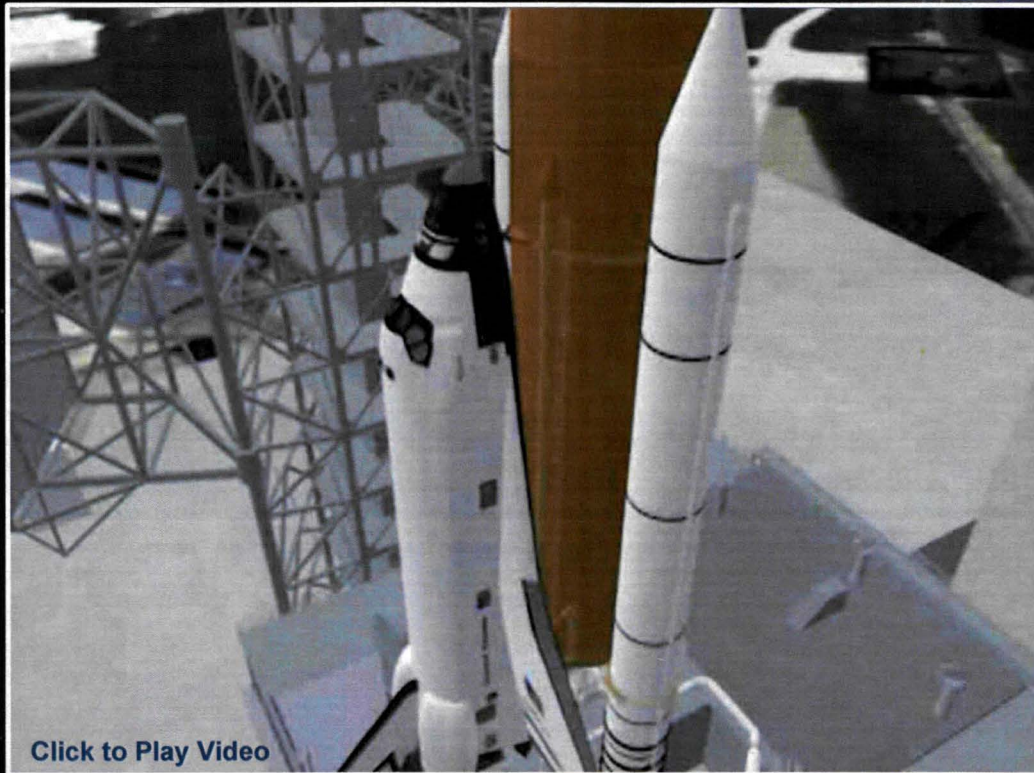
Modeling

To develop a virtual environment, DV acquires accurate 3D models of the equipment and facilities to be simulated. Existing CAD models, such as Pro/E, CATIA, Unigraphics NX, or AutoCAD can be imported into the 3D environment, as can models in neutral file formats such as STEP or IGES. DV also creates 3D models from drawings and scan data. DV's short, mid, and long scanners having a range of sub-millimeter to 350 meters. Reverse Engineering techniques convert point cloud scan data to 3D CAD models. Model components are then organized and given colors and textures for a realistic and natural appearance.



KSC Design Visualization

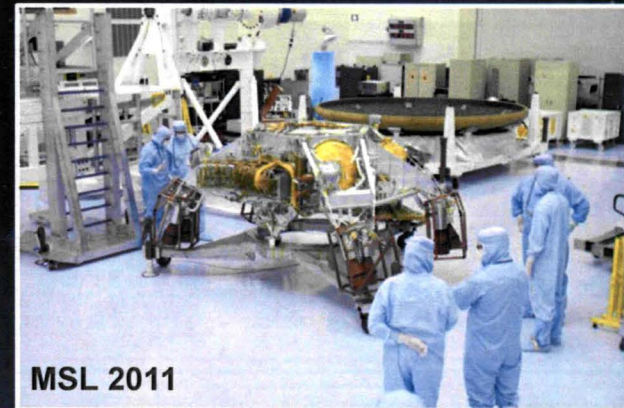
Perform simulations of ground operations leading up to launch at Kennedy Space Center and Vandenberg Air Force Base in CA since 1987.



[Click to Play Video](#)



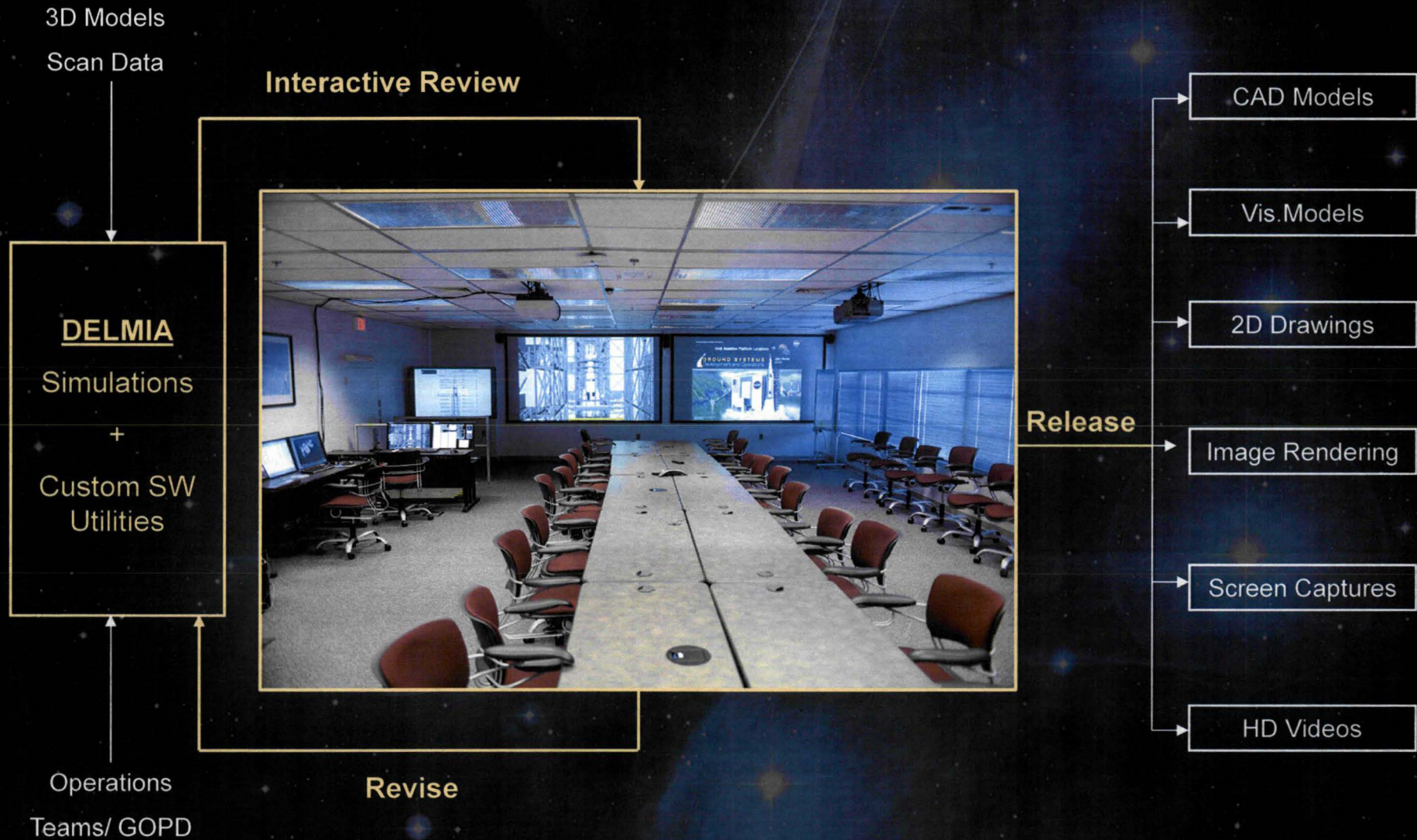
MSL 2008



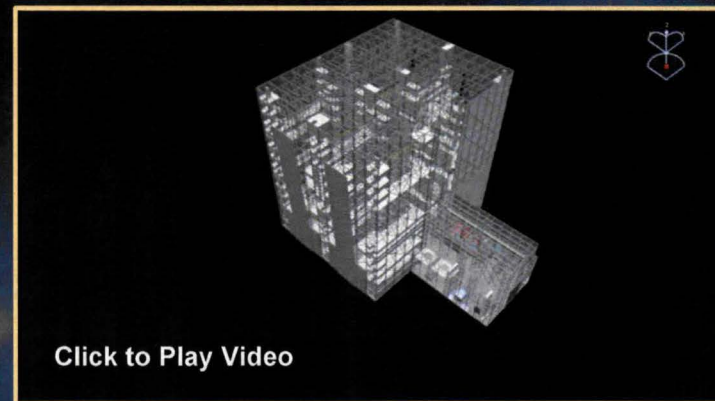
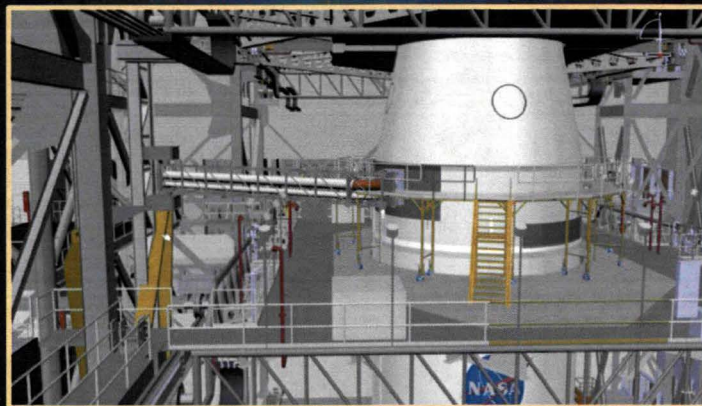
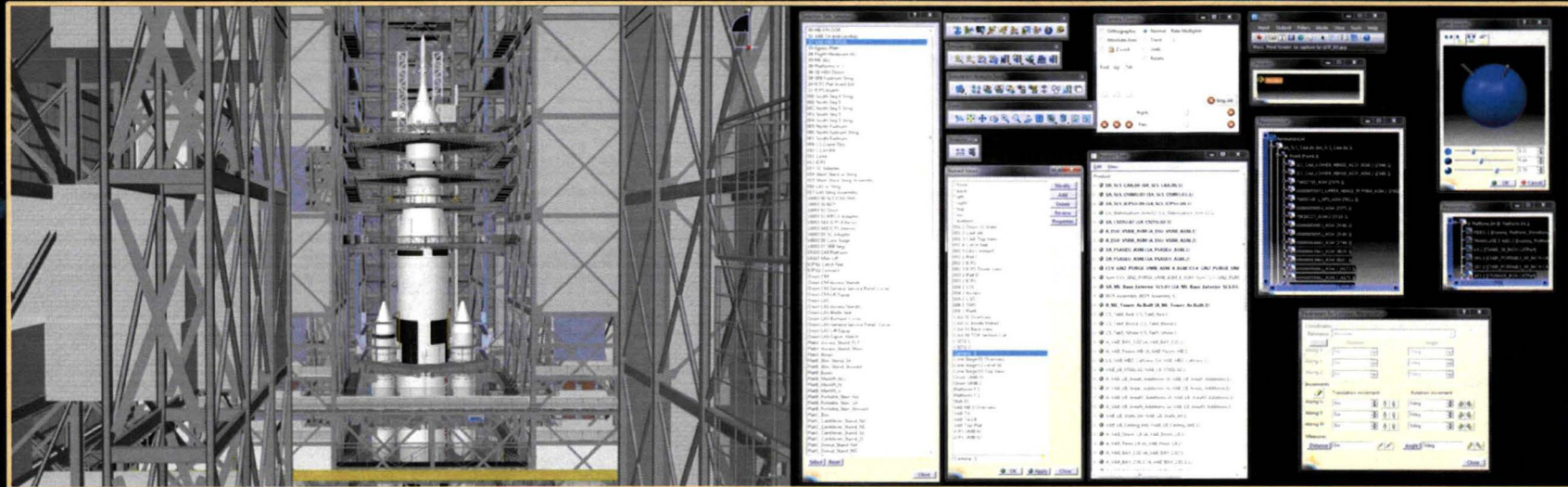
MSL 2011

We use 3D Laser Scanning, Modeling and Simulations to make verify that operations are feasible, efficient, and safe.

Interactive Review Meetings & Product Development

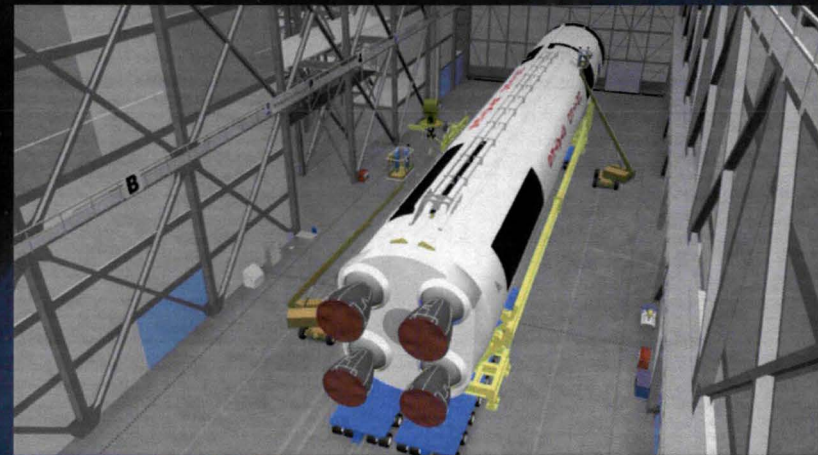
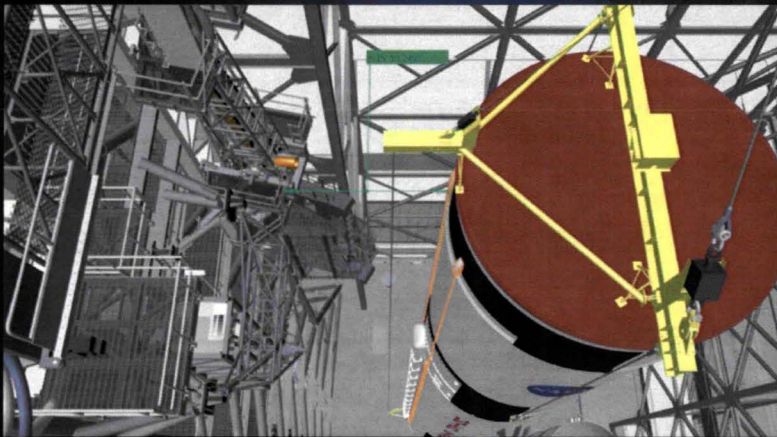
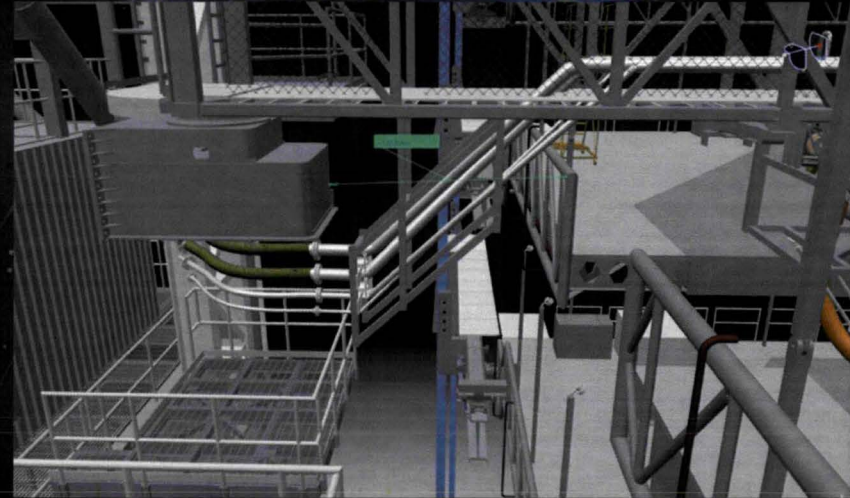
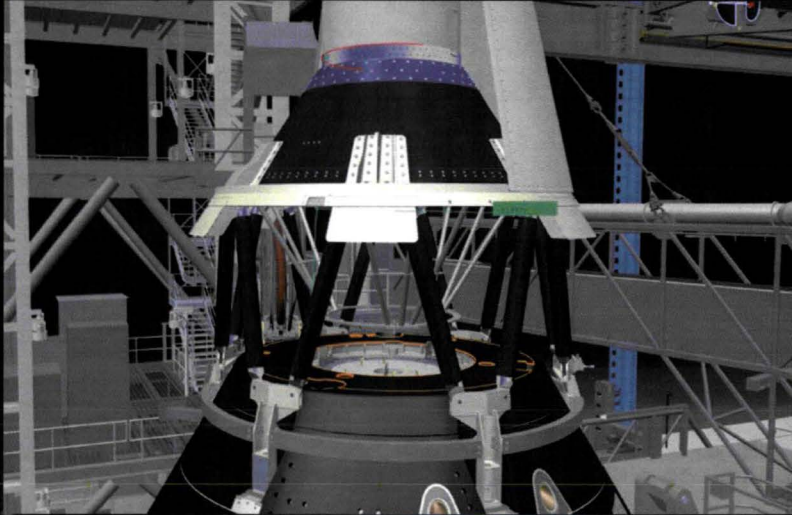


Interactive Review Meetings & Product Development



[Click to Play Video](#)

Interactive Review Meetings & Product Development





Leica AT401

Laser Tracker

Range: 1.5-160m (4.9-525ft)

Speed:

Single point measurement

Range Accuracy:

0.01mm (.0004in)

FOV: 360° x 145°



GOM ATOS IIe

Structured White Light Scanner

Range: 0.29-2.96m (1-9ft)

Speed:

5,000,000 points/capture

Range Accuracy:

0.127mm (.005in)

Maximum Scan Volume:

1.7 x 1.36 x 1.60m³



**Perceptron V4 and
Romer 3000i**

Laser Scanner Arm

Range: 152mm- 203mm (6-8in)

Speed:

23,040 points/second

Range Accuracy:

0.2mm (0.008in)

FOV: 24mm - 73mm width



Trimble S6

Surveying Total Station

Range: .2-5500m (.6-18,044ft)

Speed:

Single point measurement

Range Accuracy: 1

mm (.039in)

FOV: 360° x 145°



Mantis Vision F5

Array Laser Scanner

Range: 0.5-4.5m (1.6-14.7ft)

Speed:

50,000 points/frame @ 10fps

Range Accuracy:

0.5mm (.019in) @ 1m

FOV: 38° x 44°



Trimble FX

Phase Shift Laser Scanner

Range: 0.4-30m (1.3-98ft)

Speed:

1,200,000 points/second

Range Accuracy:

0.5mm (.019in) @ 5m

FOV: 360° x 270°



FARO Focus3D S 120

Phase Shift Laser Scanner

Range: 0.6-120m (2-394ft)

Speed:

976,000 points/second

Range Accuracy:

2mm @ 25m

FOV: 360° x 305°



Trimble GX

Time-of-flight Laser Scanner

Range: 1.5-350m (5-1148ft)

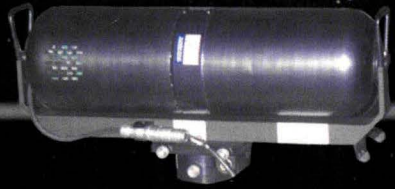
Speed:

5000 points/second

Range Accuracy:

7 mm (.27in) @ 100 m

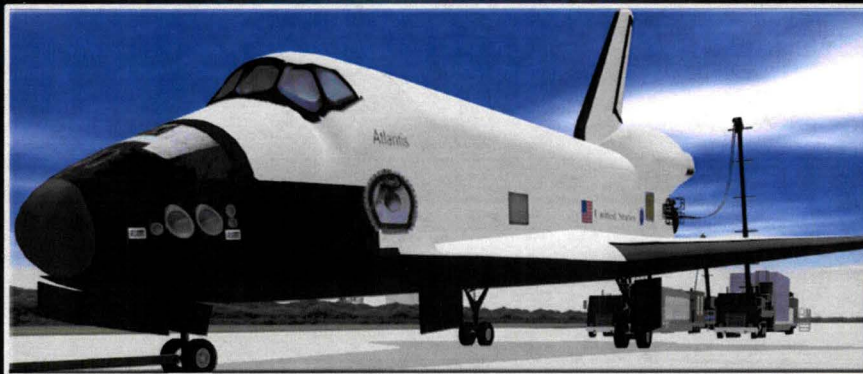
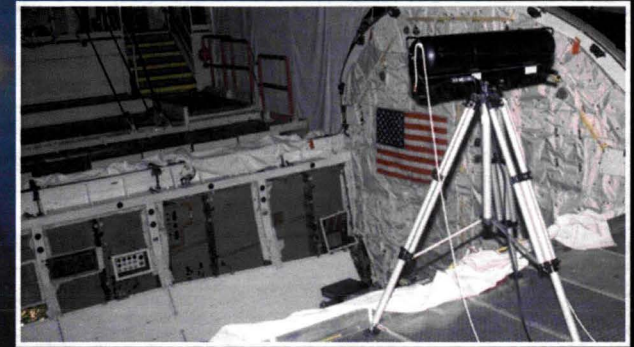
FOV: 360° x 60°



MENSIS S10

Scanning, Modeling, & Simulation

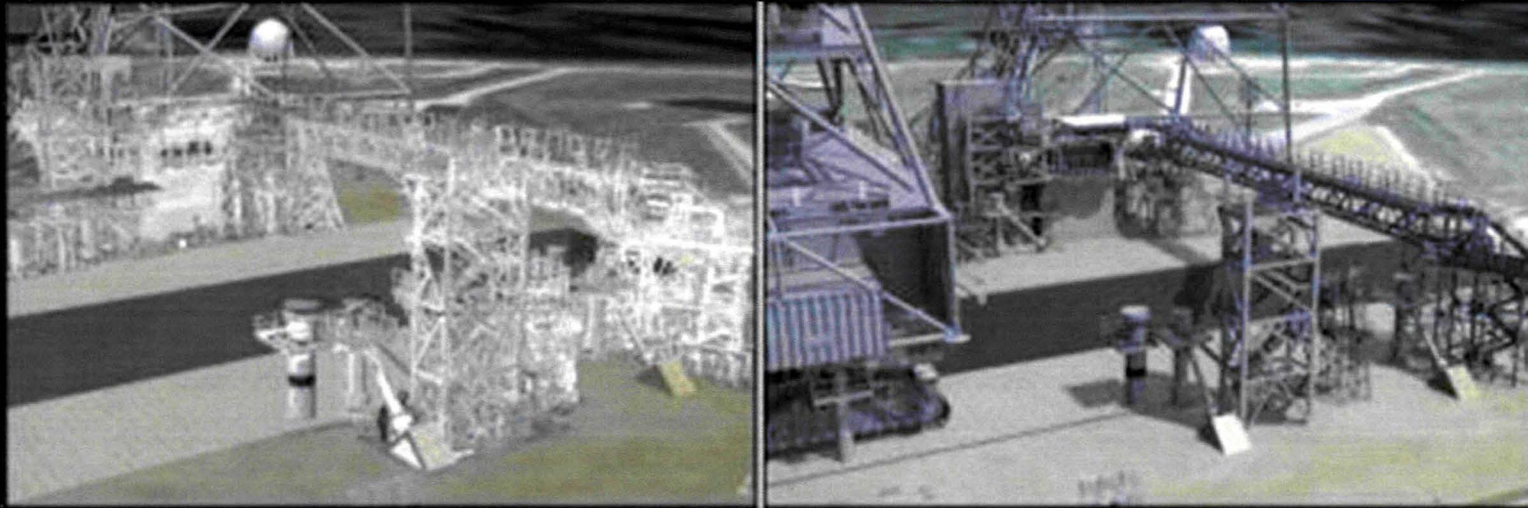
Replaced tape measure with first scanner in 2001. Started scanning spacecrafts & shuttle systems for ground processing simulations.



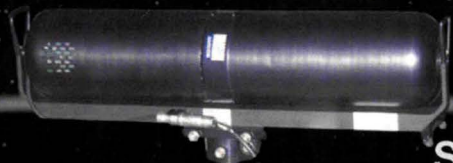
[Click to Play Video](#)

KSC Design Visualization

Scanning, Modeling, & Simulation



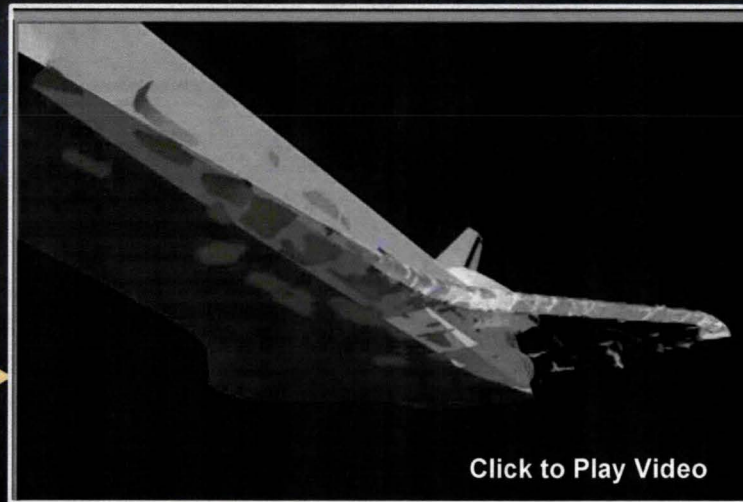
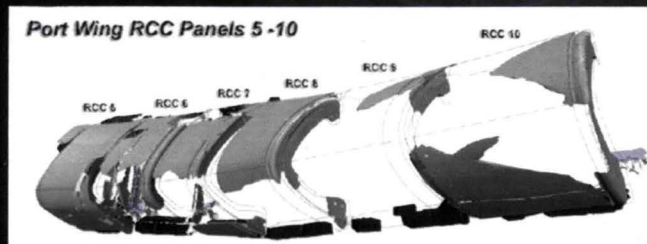
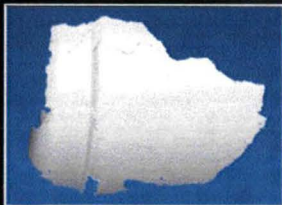
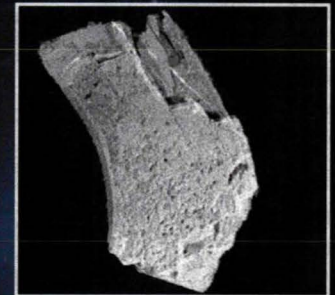
KSC Design Visualization



MENSI S25

Scanning, Modeling, & Simulation

Supported Columbia digital reconstruction in 2003. Provided real time scanning/modeling/simulation on hanger floor to support investigation.

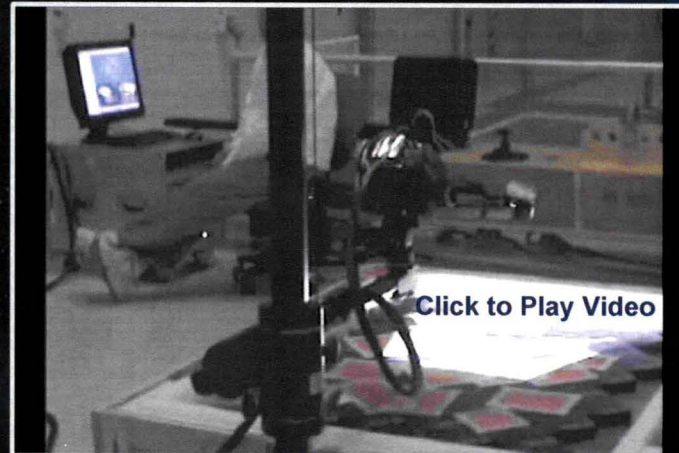
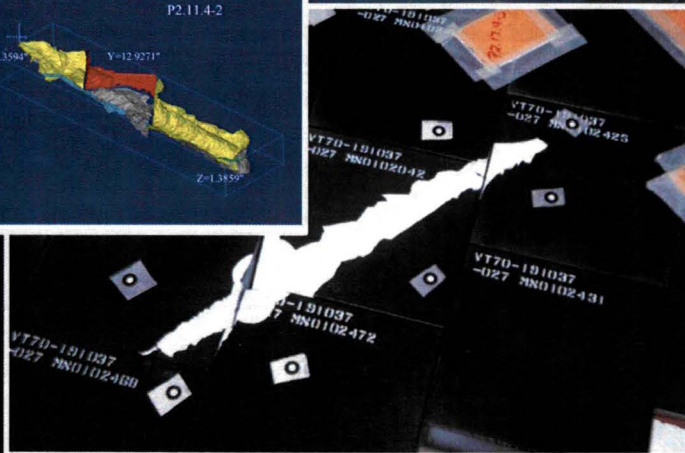
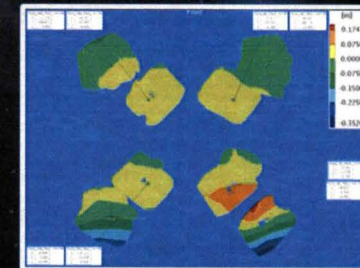
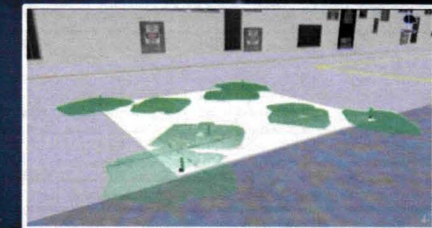
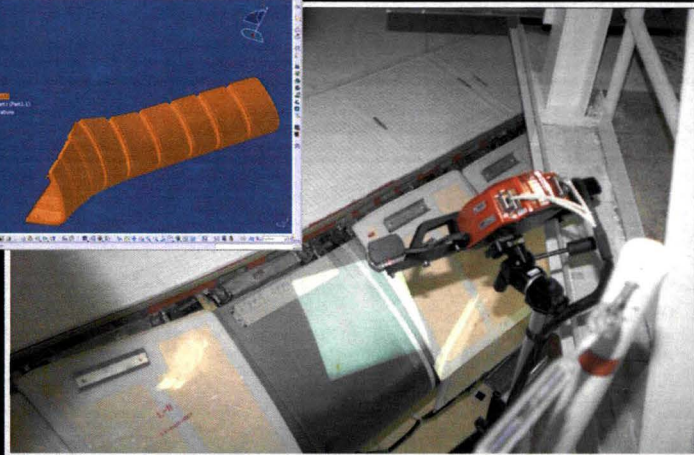
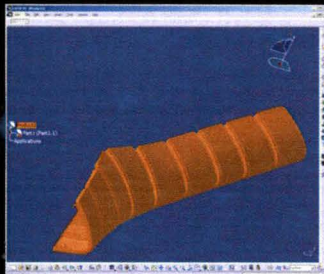


Scanning, Modeling, & Simulation



GOM ATOS II

Started operating two ATOS precision white light optical scanners in 2004.



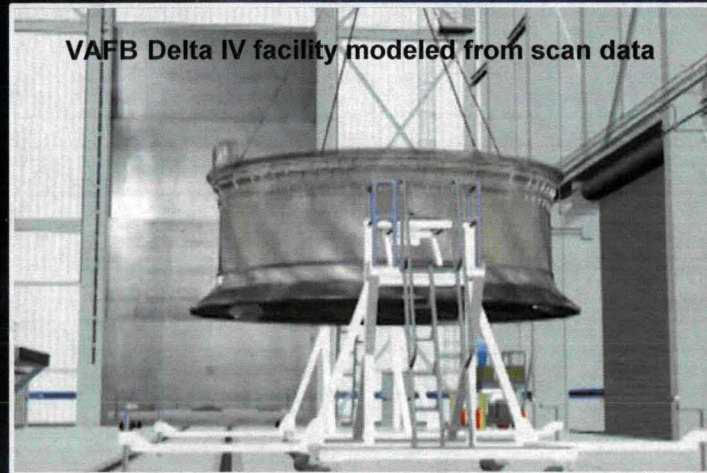
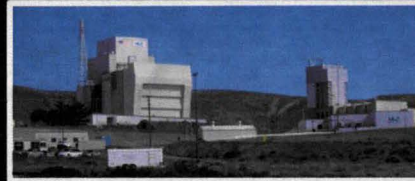


Trimble GX

San Range:
350 Meters

Scanning, Modeling, & Simulation

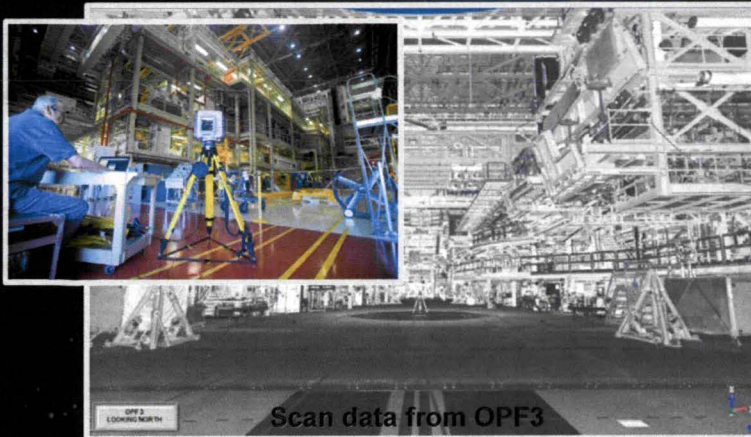
Upgraded to two Trimble GX scanners and added a Total Station to support large scale scanning and survey workflow.



VAFB Delta IV facility modeled from scan data



VAFB SLC-6 Scan Data



Scan data from OPF3

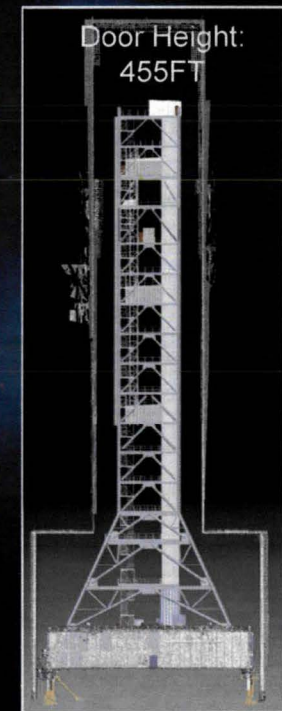


OPF3 modeled for CCDev



Trimble S6

Range:
5500 Meters
(18,000FT)



Door Height:
455FT



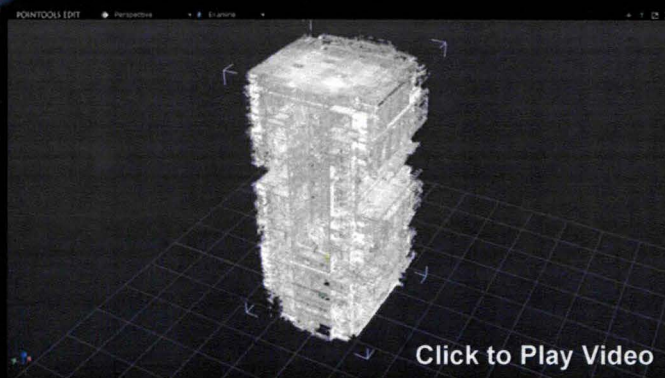
Scanning, Modeling, & Simulation

Added a FARO Focus3D scanner to support rapid/high volume scanning & 3D documentation in 2011.

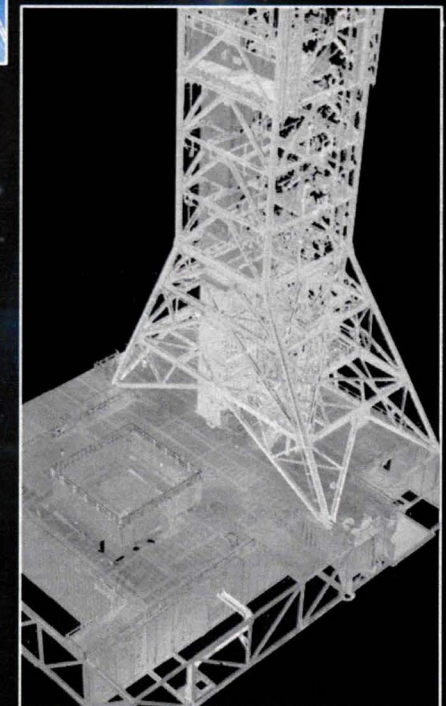
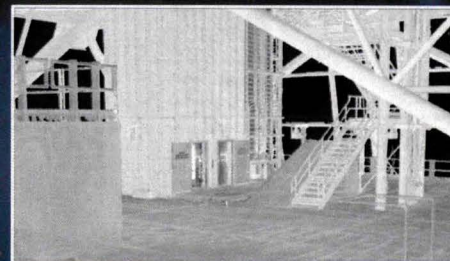
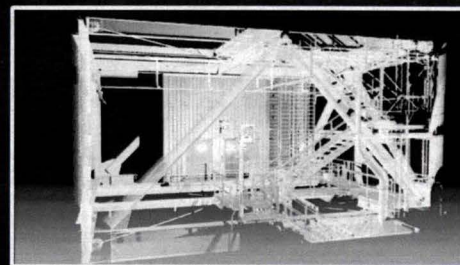
FARO Focus3D

Range: 120 Meters (294 Ft)

Rate: 976,000 PPS



Mobile Launcher
165 ft x 135ft x 47 ft Base
355 ft Tower with 14 levels





Surphaser IR-X

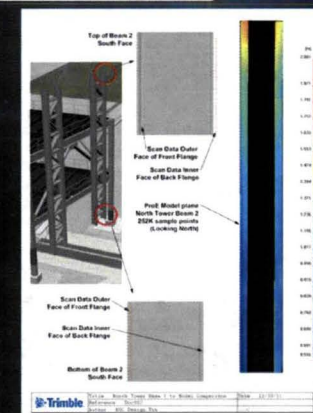
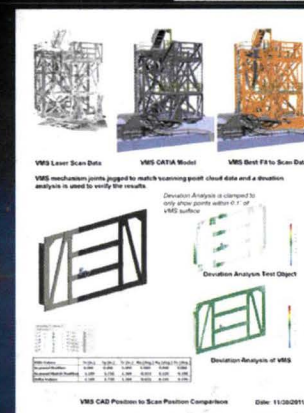
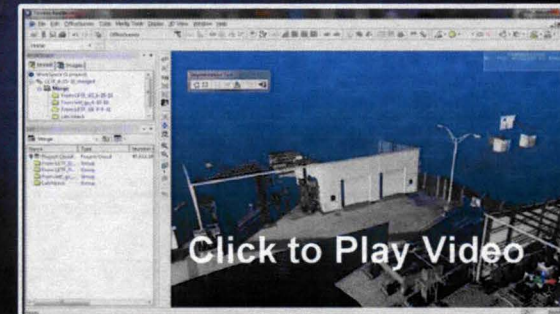
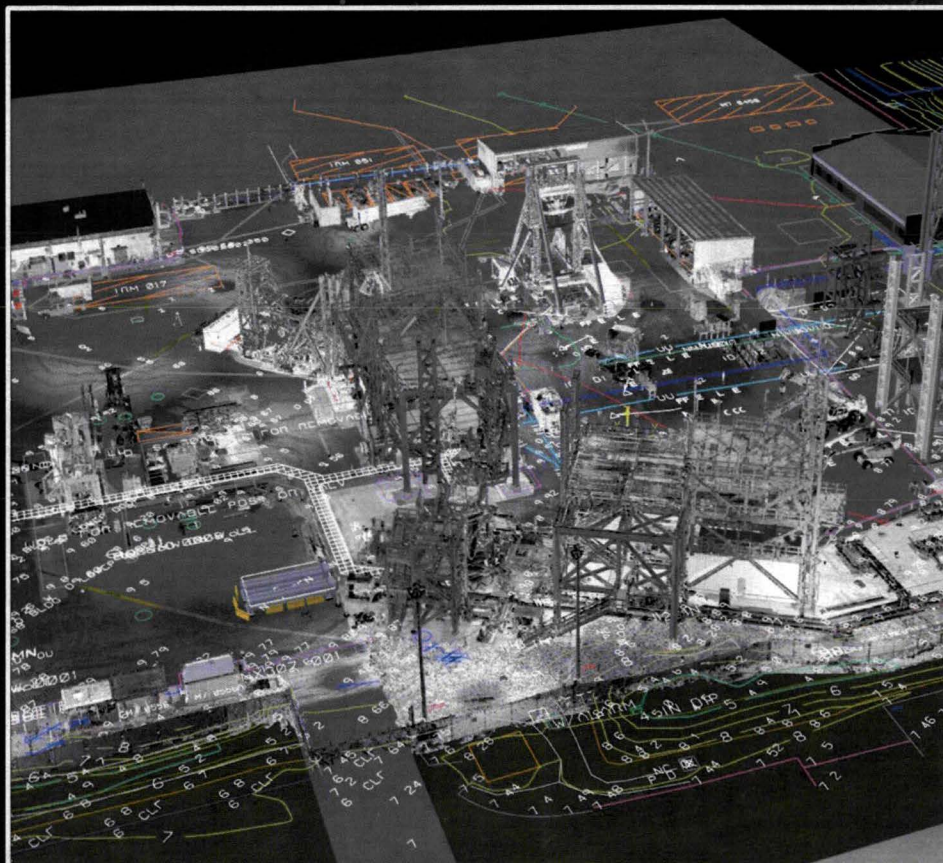
Scan Range: 30 Meters
Scan Rate: 1,200,000 pps

Scanning, Modeling, & Simulation

Added a precision scanner and laser tracker for sub-millimeter measurements in 2011.

Lieca AT401

Scan Range: 160 Meters

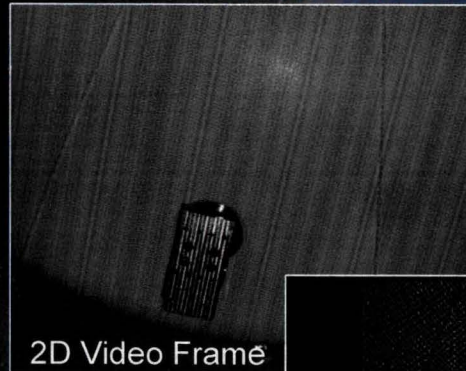


Scanning, Modeling, & Simulation



Mantis Vision F5

Scan Range: .5-4.5 Meters



2D Video Frame

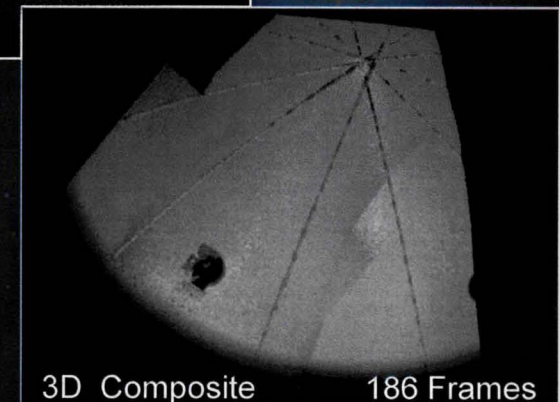


3D Video Frame



Mantis Vision F5
3D Video Laser Scanner

[Click to Play Video](#)



3D Composite

186 Frames

Fast response – Mobile office/equipment

Process scan data concurrently with data collection at job site. Trailer equipped with air conditioning & generator.

